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Status of Beavers (*Castor canadensis*) in Valle de Mexicali, México

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Abstract.—To determine the current status of beavers (*Castor canadensis*) in Valle de Mexicali, Mexico, we surveyed the area in late 1995 and early 1996. We found evidence of current presence of beavers at 20 sites; 11 additional sites had evidence of past use. Most sites were along the Río Colorado. Population levels of beavers in the area are highly variable and depend on extraordinary water releases through the Río Colorado.

Resumen.—Con el fin de determinar el estado del castor (*Castor canadensis*) en el Valle de Mexicali realizamos prospecciones a finales de 1995 y principios de 1996. Encontramos evidencias de presencia actual de castor en 20 sitios; otros 11 sitios tenían evidencias de uso anterior. La mayoría de estos sitios se encontraban a lo largo del Río Colorado. Las poblaciones de castores en esta región son altamente variables y dependen de las aportaciones extraordinarias de agua del Río Colorado.

The Río Colorado and tributaries historically had abundant water and maintained large stands of willows (*Salix gooddingii*, *S. exigua*, and *S. hindsiana*) and cottonwoods (*Populus macdougalii*) along its banks and inundation flats (Wiggins 1980; Ezcurra et al. 1988). These areas supported abundant beavers (*Castor canadensis*; Stone and Rhoads 1905; MacDougal 1906; Mearns 1907; Pattie 1831). The watercourse in the area was changed extensively early in the 20th century as a requirement for agriculture. This lead from time to time to the near dissapearance of beavers from most of the area (Sykes 1937*a*, *b*). Overall, however, beavers continued to be a typical component of the region (Burt 1938; Dixon 1922; Huey 1964; Leopold 1953). Indeed, some areas that once were unsuitable for beavers developed suitable habitat as a result of management of water for agriculture (Dixon 1922; Grinnell et al. 1937; Tappe 1942). Irrigation practices and agricultural development in the Valle de Mexicali intensified in the 1960s, reducing the extent of wetlands (Mellink 1995). Also, hunting periodically substantially reduced beaver populations (Grinnell 1914; Pattie 1831).

The current status of beavers in the Mexican portion of the drainage of the Río Colorado was unknown, although it was supposed that they persisted in small numbers (Ceballos 1985; Ceballos and Navarro 1991). The purpose of this survey was to determine the extent of the presence of beavers in this area.

Methods

In October and November 1995 we visited all major water bodies in the Valle de Mexicali. As we had surveyed the Ciénega de Santa Clara in previous years,

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we did not visit it at this time. We also interviewed colleagues with ample knowledge of the Ciénega. We inspected 80 sites, and five stretches of the Río Hardy. The sites and river sections were surveyed from a car, on foot, or with a kayak. In all places, we searched for past and current evidence of use by beavers: felled trees, stumps, branches in the water, dikes, dens, and slides. On 7 February 1996, we searched for dams or dens, aboard a Cessna 182 airplane, flying over the central and northern sections of the mexican portion of the Río Colorado, and over the Ciénega de Santa Clara.

Results

We found evidence of current occupation by beavers at 20 sites, some of which had also evidence of past use; 11 other sites had evidence only of past use (Figure 1). Beavers likely occur at some other, unsurveyed, locations in the area. Beavers were found from Presa Morelos, at the northern border with the United States, to the Vado de la Carranza, the intersection of the Río Colorado with the road south out of Colonia Carranza; in one spot at the end of Canal El Caimán (formerly Canal Pescaderos), and in the Río Hardy south of Campo Mosqueda. Evidences of past use followed the same pattern, and filled in current gaps. Evidence of former use was found also at two sites at the seldom-watered Canal Médanos, and local residents informed us about past presence of beavers in Canal Álamo. This channel had been cleaned a few months prior to our visit, and no evidence of its past occupation was left.

The places that had only signs of past use by beavers reflect a current contraction of the area occupied by them, resulting from the drying of the water bodies. Also, sites with beavers to which we made succesive visits 2–3 weeks apart were rapidly drying.

Beavers were clearly associated with willows and cottonwoods, in addition to the water, as elsewhere in the Lower Colorado. On occasions beavers were present where water was limited to small stagnant pools, or to thin, shallow currents. The absence of beavers from the Río Hardy north of Campo Mosqueda, which has abundant water and where beavers were once common, can be associated with the lack of willows and cottonwoods; the only trees now present are shruby tamarisks (mainly *Tamarix pentandra*). Current existence of beaver dams, as opposed to their absence earlier in the century (Leopold 1959), is the result of the change in the type of watercourses, from a large river to small currents.

Some of the sites occupied by beavers were depressions that resulted from the construction of a protection levee on the eastern side of the Río Colorado during 1979–1981 (Sánchez-Ramirez 1990). These depressions, which can be several meters deep, were surrounded by willows and cottonwoods. In all such holes that we inspected, we found evidences of activity of beavers, either current or past.

The Ciénega de Santa Clara is a large wetland created and maintained by brine water from the Wellton-Mohawk Irrigation District, Arizona (Glenn et al. 1992). Beavers can occupy this type of marsh, when they have willows, as in Mittry Lake, Arizona (R. Henry, pers. comm.; Todd 1986). However, the Ciénega de Santa Clara has few trees, mostly restricted to the edges. Moreover, these are not the beavers' preferred trees, but western honey mesquites (*Prosopis glandulosa* var. *torreyana*), screwbean mesquites (*P. pubescens*), and tamarisks (*Tamarix ra-*

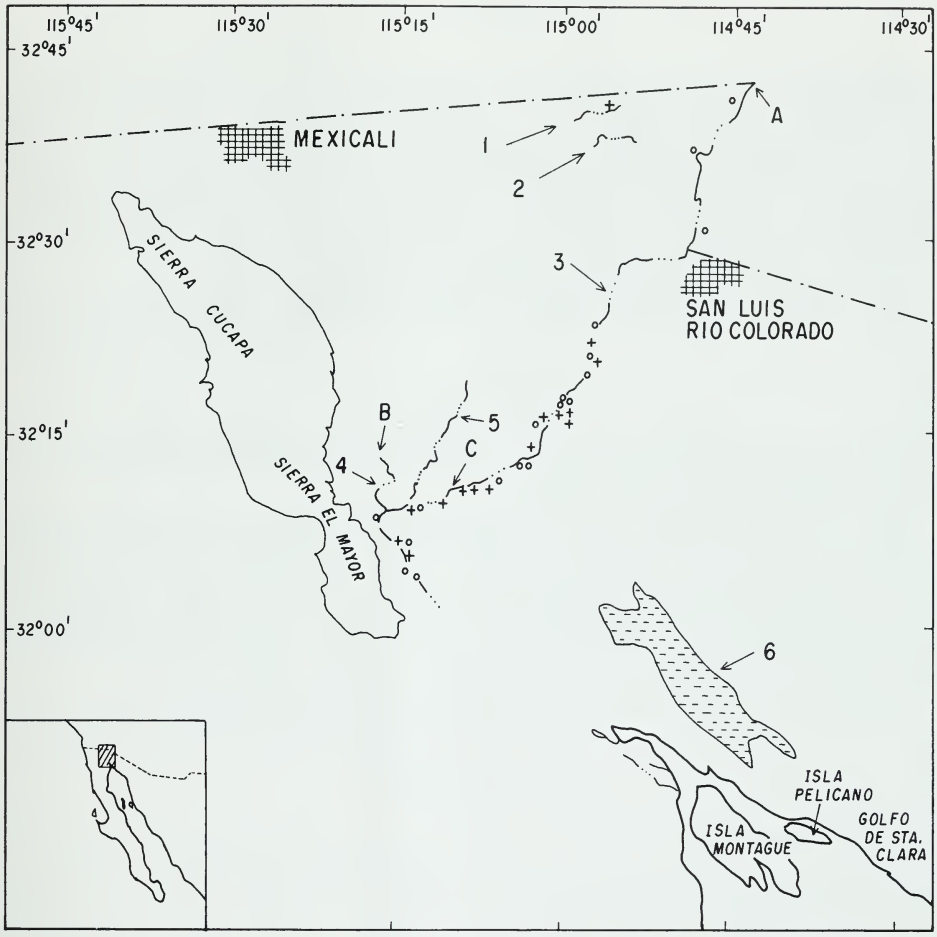

Fig. 1. Sites with beaver activity in the Valle de Mexicali, México. Circles represent beaver presence in October–November 1995. Plus signs, sites with evidence of past use by beavers. Numbers indicate waterbodies, and letters, specific locations: 1 = Canal Médanos, 2= Canal El Álamo, 3 = Río Colorado, 4 = Río hardy, 5 = Canal El Caimán (formerly Canal Pescaderos), 6 = Ciénega de Santa Clara, A = Presa Morelos, B = Campo Mosqueda, and C = Vado de la Carranza.

mosissima) (Zengel et al. 1995), which explains why neither we nor colleagues who have worked in the area have seen any evidence of beavers.

In two cases, beavers had cut stems of young tamarisks, and in two sites they seemed to be relying exclusively on tule roots (*Scirpus americanus*). Tappe (1942) considered that tules could be a more important food than commonly considered. We found them to be used rarely, and in one of the sites with heavy use of tules, beavers had been using willows until the drying of the steep-sided pool they lived in left such trees out of reach. Tules seemed, therefore, to be an emergency food.

Some people in the area eat beavers on occasion, but this does not seem to happen often. In two places, beavers were a nuisance, as they were felling trees that had been planted or were being cared for. Rather than killing the beavers, the people in charge protected the trees with old barrels and salvaged metal.

Discussion

Once control of water for agriculture began, flow in natural watercourses was reduced and the courses themselves suffered major changes. Beavers followed these changes, and some locations where beavers have been found were suitable only as a result of watercourse management. The locality of the only museum specimen from the region of which we are aware, and the locations reported by Dixon (1922), Grinnell et al. (1937), Leopold (1953), and Tappe (1942), and three of our sites were all in such newly developed riparian habitat.

The completion of Hoover Dam (in 1935) and Glenn Canyon Dam (in 1963) caused a severe reduction in water flow through the Río Colorado, and an accordingly severe reduction in populations of beavers in the Valle de Mexicali. Before 1960, beavers were locally abundant, but even then they suffered fluctuations due to dry periods, as in 1934 (Tappe 1942). Between 1960 and 1978, water in the Río Colorado south of the border was extremely scarce, and the beaver population surely was reduced.

Since 1978, there have been some important flow events in the mexican portion of the Río Colorado. These flows, especially the one resulting from the 1982–1983 El Niño Southern Oscillation (ENSO) event, promoted the development of riparian vegetation and an increase in the beaver population along the Río Colorado. Elsewhere, waterways that are usually dry (the Álamos and the Médanos, for example) received plenty of water at this time and, also, beavers.

Information on the Río Hardy's water history is difuse. During 1960-1978, it seems to have had rather stable, deep water, as the area north of Campo Mosqueda does today. Since 1947, a naturally formed dam near the entrance of the river to the Gulf of California caused the development of a large wetland, the Río Hardy marsh (J.M. Payne, pers. comm.). At least the northern section of this marsh had abundant willows and cottonwoods. The 1982-1983 ENSO caused the flooding of a vast area below the protection levee and created a large wetland that joined the Río Hardy marsh. A large community of willows and cottonwoods developed, and, according to riverside inhabitants, beavers were abundant. However, the intense flows of the mid-1980s also eroded the dam (J.M. Payne, pers. comm.), and when water flow ceased the marsh drained. Later on, the water level in the Río Hardy dropped as well.

Water flow was negligible during 1989–1992, but the 1992–1993 river discharges revived some beaver colonies. At the time of our survey, the pools in the river were drying once more; some colonies had disappeared, and others were drying rapidly. In November 1995, water levels in the Río Hardy were lowering rapidly and only a few beavers remained. Photographs take by us in 1994 contrast with the 1995 condition. However, during the aerial reconnaissance of February 1996, the Río Hardy seemed to have a higher water level than during the previous autumn.

When large amounts of water are released into the Río Colorado they can destroy existing beaver dams and carry animals away, sometimes for great distances. During the 1982-1988 flows, beavers were seen by the fuel dock at the Estero de Santa Clara, and one was captured on the sandy seashore of Golfo de Santa Clara, in the Gulf of California (R. Pita and M. J. Sánchez, pers. comm.).

These animals were a distance of about 70 Km from the closest colony at that time, across unsuitable habitat.

Although numbers of beavers in the Valle de Mexicali fluctuate dramatically and often approach extirpation, it is difficult to give them a legal risk status. The local subspecies (*C. c. frondator*, after Hoffmeister 1986) is widespread and has healthy populations in adjacent areas in the United States, where beavers are often considered a nuisance, and are controlled accordingly. There is no management plan for beavers in the valle de Mexicali, and the conservation of the habitat, in this area is fortuitous and completely marginal to agricultural production. Currently, beaver habitat is created mostly by rare extraordinary water releases through the Río Colorado.

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